

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
AGENDA ITEM REQUEST

AGENDA REQUESTED: April 11, 2007

DATE OF REQUEST: March 23, 2007

**NAME & NUMBER OF PERSON TO CONTACT REGARDING
CHANGES TO THIS REQUEST, IF NEEDED:** Dania
Grundmann, 239-3449.

CAPTION: Docket No. 2007-0160-TML. Consideration for approval to publish and solicit public comment on a draft TMDL Implementation Plan for zinc in oyster tissue in Nueces Bay (Segment 2482) in Nueces and San Patricio Counties. Nueces Bay drains the Nueces River Basin, along with portions of the San Antonio-Nueces and Nueces-Rio Grande Coastal Basins.

(Faith Hambleton, Marc Friberg)

D.C. Schanbacher
Chief Engineer

CHIEF CLERKS OFFICE

2007 MAR 23 AM 11:30

TEXAS
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QUALITY

THE NATIONAL ACADEMY OF SCIENCES
OF THE UNITED STATES OF AMERICA

REPORT OF THE COMMITTEE ON THE STATUS OF THE
NATIONAL ACADEMY OF SCIENCES

FOR THE YEAR 1964

THE NATIONAL ACADEMY OF SCIENCES
OF THE UNITED STATES OF AMERICA
WASHINGTON, D. C. 20540

The National Academy of Sciences of the United States of America was organized in 1862 to advise the President of the United States on matters relating to the advancement of science and the promotion of the progress of knowledge among men. The Academy has since that time been a leading organization in the field of science and has played a major role in the development of the scientific community in the United States. The Academy's primary concern is the advancement of science and the promotion of the progress of knowledge among men. The Academy has since that time been a leading organization in the field of science and has played a major role in the development of the scientific community in the United States.

Dr. Philip H. Klayton
President

Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Commissioners

Date: March 23, 2007

Thru: LaDonna Castañuela, Chief
Glenn Shankle, Executive Director

From: David C. Schanbacher, P.E., Chief Engineer
Chief Engineer's Office

DCS

Docket ID: 2007-0160-TML

Subject: Release of draft implementation plan for public comment

CHIEF CLERK'S OFFICE

2007 MAR 23 AM 11:31

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

Issue Consideration for approval to publish and solicit public comment on a draft Implementation Plan for one TMDL for zinc in oyster tissue in Nueces Bay (Segment 2482) in Nueces and San Patricio Counties. Nueces Bay drains the Nueces River Basin, along with portions of the San Antonio-Nueces and Nueces-Rio Grande Coastal Basins.

Background and Current Practice Elevated levels of zinc in oyster tissue in Nueces Bay have resulted in the impairment of the fish consumption use of the bay. One TMDL for zinc in oyster tissue was developed as required by Section 303(d) of the federal Clean Water Act. The commission adopted the TMDL in November 2006, and EPA approved the TMDL in December 2006. The next step in the process is the development of an implementation plan, a flexible tool that organizations involved in TMDL implementation will use to guide their programs.

The TCEQ has established a process for preparing implementation plans. The process includes opportunity for public input and comment. TCEQ staff prepare a draft implementation plan by coordinating with internal programs, other state agencies, and stakeholders. A key aspect of establishing an effective implementation plan is obtaining input and commitments from other state agencies and stakeholders who have responsibility for implementing control actions and management measures that fall outside of the TCEQ's authority.

Upon completion of the draft implementation plan, TCEQ staff request approval from the commission to solicit public comment and hold a public meeting in the watershed. After the public comment period, TCEQ staff may revise the implementation plan, if appropriate. The implementation plan, combined with the TMDL, provides local, regional, and state organizations with a comprehensive strategy for restoring and maintaining water quality in an impaired water body.

Question Does the commission approve the Executive Director's request to publish and solicit public comment on the draft *Implementation Plan for One Total Maximum Daily Load for Zinc in Oyster Tissue in Nueces Bay, For Segment Number 2482*?

Agency contacts:

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Marc Friberg, Staff Attorney, 239-0611

Attachments

cc: Chief Clerk, 5 copies
Executive Director's Office
David C. Schanbacher, P.E.
Jason Skaggs
Ashley K. Wadick
Office of General Counsel

cc (without attachments): Marc Friberg, Staff Attorney
Andrew Sullivan, Project Manager

Nueces Bay (Segment 2482) Implementation Plan for Zinc in Oyster Tissue

Summary Outline – March 8, 2007

I. Introduction

- An Implementation Plan is prepared for each TMDL adopted by the TCEQ.
- The Implementation Plan describes the actions that will be taken to achieve the load allocations specified in the TMDL and the means by which these actions will be tracked, evaluated, and reported.

II. Summary of TMDL

- A TMDL for Zinc in Oyster Tissue in Nueces Bay (Segment 2482) was adopted by the TCEQ on November 1, 2006. Approval of the TMDL by the USEPA occurred on December 15, 2006.
- Nueces Bay is a shallow, secondary bay that receives freshwater inflows from the Nueces River (Segments 2101 tidal and 2102 above tidal) and exchanges saline water with Corpus Christi Bay (Segment 2481). The headwaters of the Nueces River originate in central Texas and flow approximately 315 miles before reaching Lake Corpus Christi (Segment 2103) and ultimately Nueces Bay. Principal tributaries of the Nueces River above Lake Corpus Christi include the Atascosa and Frio Rivers.
- From 1942 to 1985 the American Smelting and Refining Company (ASARCO) operated a zinc smelting facility in the Nueces Bay area and discharged effluent along the southwestern shoreline of Nueces Bay and to the Corpus Christi Inner Harbor (CCIH). Several billion tons of zinc ore were processed during that time and believed to be the source of zinc that is still present. The Nueces Bay Power Station (NBPS) is permitted to take water from the CCIH to discharge as once-through cooling water. Discharge from the plant ceased in 2002 due to low demand, however, the permit remains active in anticipation of restarting the plant in the future.
- Nueces Bay was originally placed on the TCEQ's 303(d) list of impaired waters in 1998 for nonsupport of the oyster waters use due to high levels of zinc in tissue in 100 percent of the bay (28.9 square miles).
- The TMDL analysis identified lower than expected levels of zinc in the water, due primarily to improved analytical methods for zinc. As a result, the TMDL identifies excess capacity for zinc loading to the bay.
- Levels of zinc in sediment are still elevated due to legacy discharges however, sampling indicates that these levels are attenuating over time.

- Levels of zinc in oyster tissue, however, still remain above the criterion established to protect the oyster water use.

III. TMDL Implementation Strategy

- The TMDL Implementation Strategy describes the actions that will be undertaken to achieve the load allocations specified in the TMDL.
- Since the TMDL does not require a reduction in total loads of zinc to surface waters, control of sources will not be necessary. Attenuation of zinc in oyster tissue will be tracked through data collection from oysters at several locations in the Bay. In addition water quality will be monitored in the Corpus Christi Inner Harbor and Nueces Bay through existing programs to ensure that zinc levels are maintained at current levels.
- To provide adequate protection for the oyster water use, the TMDL analysis also identified the need to make changes to the water quality criteria through updates to the Surface Water Quality Standards (Title 30 TAC §307.1-10). The revision process was initiated in 2007.

IV. TMDL Tracking Strategy

- The TCEQ will track programmatic indicators (administrative actions) and water quality indicators (water quality conditions) resulting from the implementation of the TMDL Action Strategy to determine if progress is being made toward meeting water quality standards.
- The TCEQ TMDL Program will initiate a project to collect additional data to evaluate the attenuation of zinc in oyster tissue levels throughout Nueces Bay. In addition, water and sediment will also be sampled to ensure that current activities do not result in resuspension of zinc which would prolong attenuation.
- The evaluation of the success of the implementation activities will be evident in reductions in oyster tissue zinc levels. Assessment of the oyster tissue data should provide insight to trends in zinc levels over time.

V. TMDL Review Strategy

- The TCEQ and project stakeholders will periodically assess the results of the TMDL tracking activities and other sources of information to evaluate the adequacy of the TMDL Implementation.
- The data collected through implementation tracking will be evaluated in order to assess attenuation of zinc in oyster tissues. Review of this data will provide insight towards the rate at which levels of zinc are decreasing and the affect of lower concentrations in the water column. If attenuation does not result in

acceptable levels of zinc in oyster tissue the plan will need to be revised to evaluate other potential sources identified in the TMDL

VI. TMDL Communication Strategy

- Communication is necessary to ensure stakeholders understand the TMDL Implementation Plan and its progress in restoring water quality conditions.
- Results and progress will be documented in the TMDL Program's biennial status report.



Proposed for Public Comment, April 2007

Implementation Plan for Zinc in Oyster Tissue in Nueces Bay

Segment 2482

Prepared by the:
Chief Engineer's Office, Water Programs, TMDL Section

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

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TMDL Project Reports are also available on the TCEQ web site at:
<www.tceq.state.tx.us/implementation/water/tmdl/>

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Implementation Plan for One Total Maximum Daily Load for Zinc in Oyster Tissue in Nueces Bay

Executive Summary

On November 1, 2006, the Texas Commission on Environmental Quality (TCEQ) adopted *One Total Maximum Daily Load for Zinc in Oyster Tissue in Nueces Bay*. The total maximum daily load (TMDL) addresses elevated levels of zinc in oyster tissue in Segment 2482. The U.S. Environmental Protection Agency (USEPA) approved the TMDL on December 15, 2006.

This implementation plan, or I-Plan:

- Describes the steps the TCEQ and its stakeholders will take to achieve the pollutant reductions identified in the TMDL report, and
- Outlines the schedule for implementation activities.

The ultimate goals of this I-Plan are to:

- Ensure that levels of zinc in oyster tissue attenuate to levels below the criterion that supports the oyster water use in Nueces Bay.
- Adopt a more protective and appropriate criterion for concentrations of zinc in water based on risks to human health.

The TCEQ conducted an investigation in Nueces Bay to identify sources of zinc and quantify loadings from the surrounding watershed. TMDL program staff also determined that, based on recent water quality data collected with improved methods, zinc levels in water were well below this criterion. Based on that assessment, there is an excess capacity for zinc loadings to the system. Zinc in sediment originating from historical industrial activities appears to be declining over time as well. As a result, levels of zinc in oyster tissue are expected to diminish with time and eventually fall below the criterion established which supports the designated oyster water use.

The evaluation of zinc loadings to Nueces Bay in the TMDL indicated that there are currently no existing discharges that would result in violation of the criteria. For this reason, implementation strategies will address zinc in oyster tissue as a legacy pollutant. Reductions of legacy pollutants do not typically require additional measures to reduce loadings to the water body. The attenuation of the pollutant is monitored by means of targeted sampling in the impaired area. In addition, the TCEQ also recalculated a more protective criterion for zinc in water based on risks to human health. This I-Plan recommends that this be included as a site specific criterion for Nueces Bay in the next water quality standards triennial revision.

Tracking strategies for the success of implementation will primarily rely on the collection of additional data in Nueces Bay. Water quality and sediment data will be collected quarterly as part of the statewide routine monitoring program. Tissue data will be collected

annually for a five-year period at several reference sites to detect observable trends. In the absence of additional anthropogenic loadings to Nueces Bay or Corpus Christi Inner Harbor, zinc levels are expected to decline. If this is not the case then the TCEQ will re-evaluate the TMDL and the I-Plan. The TCEQ will report the results of the tracking and evaluation activities in its TMDL program report and at regional forums.

Introduction

In order to keep Texas' commitment to restore and maintain water quality in impaired rivers, lakes, and bays, the TCEQ recognizes that it must establish implementation plans for each TMDL. The TMDL is a technical analysis that:

- Determines the amount of a particular pollutant that a water body can receive and still meet applicable water quality standards, and
- Estimates how much the pollutant load must be reduced to comply with water quality standards.

This I-Plan is designed to guide activities that will achieve the water quality goals for Nueces Bay, Segment 2482, as defined in the adopted TMDLs. The ultimate goals of the I-Plan are to:

- Ensure that levels of zinc in oyster tissue attenuate to levels below the criterion that supports the oyster water use in Nueces Bay.
- Adopt a more protective and appropriate criterion for concentrations of zinc in water based on risks to human health.

The I-Plan is a flexible tool that governmental and nongovernmental organizations involved in implementation use to guide the management of their programs. The participating organizations may accomplish the activities described in this I-Plan through rule, order, guidance, or other appropriate formal or informal action.

This I-Plan contains the following components:

- 1) A description of control actions and management measures¹ that will be implemented to achieve the water quality target.
- 2) A schedule for implementing activities to achieve TMDL objectives.
- 3) A follow-up tracking and monitoring plan to determine the effectiveness of the control actions and management measures undertaken.
- 4) Identification of measurable outcomes and other considerations the TCEQ will use to determine whether the I-Plan has been properly executed, water quality standards are being achieved, or the plan needs to be modified.
- 5) Identification of the communication strategies the TCEQ will use to disseminate information to stakeholders and other interested parties.

¹ Control actions refer to point source pollutant reduction strategies, generally TPDES permits. Management measures refer to strategies for reducing nonpoint source pollutants, generally through voluntary best management practices.

This I-Plan also includes all of the nine key elements (Table 1) for watershed-based plans as prescribed in the *FY 2004 Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories* (USEPA, 2004). Consequently, projects developed to implement nonpoint source elements of the control actions of this plan that meet the grant program conditions are eligible for funding under the USEPA's Section 319(h) incremental grant program.

Table 1: Nine key elements for watershed plans

A	Causes/Sources of Impairment	Historic discharges of zinc to the Corpus Christi Inner Harbor and Nueces Bay
	Targeted Critical Areas	Southern portion of Nueces Bay and the Corpus Christi Inner Harbor
B	Management Measures	Collection of oyster tissue, water and sediment for the analysis of zinc
C	Estimated Potential Load Reduction (lbs/Year)	n/a
D	Technical and Financial Assistance Needed for Each Measure	Federal Grants
E	Education Component for Each Measure (and Other Education)	Quarterly project reports available electronically via the project web-page
F	Schedule of Implementation for Each Measure	2008-2009
G	Interim, Measurable Milestones for Each Measure	n/a
H	Indicators to Measure Progress	Attenuation of zinc concentrations in oyster tissues
I	Monitoring Component	Special study to collect oyster tissue, sediment and water for zinc analysis
J	Responsible Entity	TCEQ

This I-Plan is designed to guide activities that will reduce zinc in oyster tissue in Nueces Bay, as defined in the adopted TMDLs. The ultimate goal of the I-Plan is to restore the oyster water use of Nueces Bay by reducing the average concentrations of zinc to levels that meet the criteria established in the state's water quality standards.

This I-Plan was prepared by the TMDL Program in the Chief Engineer's Office of the TCEQ. The TCEQ approved the I-Plan on ~~1/13/2007~~. The TCEQ has primary responsibility for restoring water quality to levels which achieve designated uses in impaired water bodies.

Summary of the TMDL

In November 2006, the TCEQ adopted *One TMDL for Zinc in Oyster Tissue in Nueces Bay* (Segment 2482). Segment 2482 is a shallow, secondary bay that receives freshwater inflows from the Nueces River (Segments 2101 tidal and 2102 above tidal) and exchanges saline water with Corpus Christi Bay (Segment 2481). The headwaters of the Nueces River originate in central Texas and flow approximately 315 miles before reaching Lake Corpus Christi (Segment 2103) and ultimately Nueces Bay. Principal tributaries of the Nueces River above Lake Corpus Christi include the Atascosa and Frio Rivers (Figure 1).

Nueces Bay (Figure 2) was originally placed on the TCEQ's 303(d) list of impaired waters in 1998 for nonsupport of the oyster waters use in 100 percent of the bay (28.9 square miles). The listing is based on the Texas Department of State Health Service's (DSHS's) shellfish classification maps, which restrict the growing and harvesting of shellfish from Nueces Bay for direct marketing due to excessive levels of zinc in oyster tissue.

Elevated levels of zinc in Nueces Bay are the result of historical discharges related to nearby metallurgical processing facilities. From 1942 to 1985 the American Smelting and Refining Company operated a zinc smelting facility in the Nueces Bay area and discharged effluent along the southwestern shoreline of Nueces Bay and to the Corpus Christi Inner Harbor (CCIH). Several billion tons of zinc ore were processed during that time and is believed to be the cause of zinc that still remains today (Barrera et al., 1995; Armstrong and Ward, 1998).

The TMDL analysis identified point and nonpoint sources of zinc that could have caused elevated levels in oyster tissue. Land surface runoff and atmospheric deposition were identified as nonpoint source inputs to Nueces Bay. Permitted municipal and industrial discharges to the segment were identified as the point sources to the system. The TMDL also identified sediments as a significant reservoir of zinc.

The TMDL analysis quantified the loadings from all of the sources to the surface water of Nueces Bay. The total loadings to surface water predicted by the analysis represent concentrations below those specified in the water quality standards. This result is lower than expected levels of total zinc in the water, due primarily to improved analytical methods for zinc. The current levels of total zinc measured with the improved methods (19.4 µg/L) are below the recalculated criterion (29 µg/L) proposed in the TMDL. As a result, the TMDL identifies excess capacity for zinc loading. Levels of zinc in oyster tissue, however, still remain above the criterion established to protect the oyster water use. The TMDL describes an implementation strategy in which zinc levels in oyster tissue are expected to decline provided that levels of zinc in the water column remain at existing levels.

The final TMDL analysis for zinc loadings to Nueces Bay resulted in the following equation:

$$\begin{aligned} \text{TMDL} &= \sum \text{LA} + \sum \text{WLA} + \text{AFG}, \text{ where} \\ \text{TMDL} &= 26.6 \text{ kg/d} + 32.6 \text{ kg/d} + 6.7 \text{ kg/d} \\ \text{TMDL} &= 65.9 \text{ kg/d} \end{aligned}$$

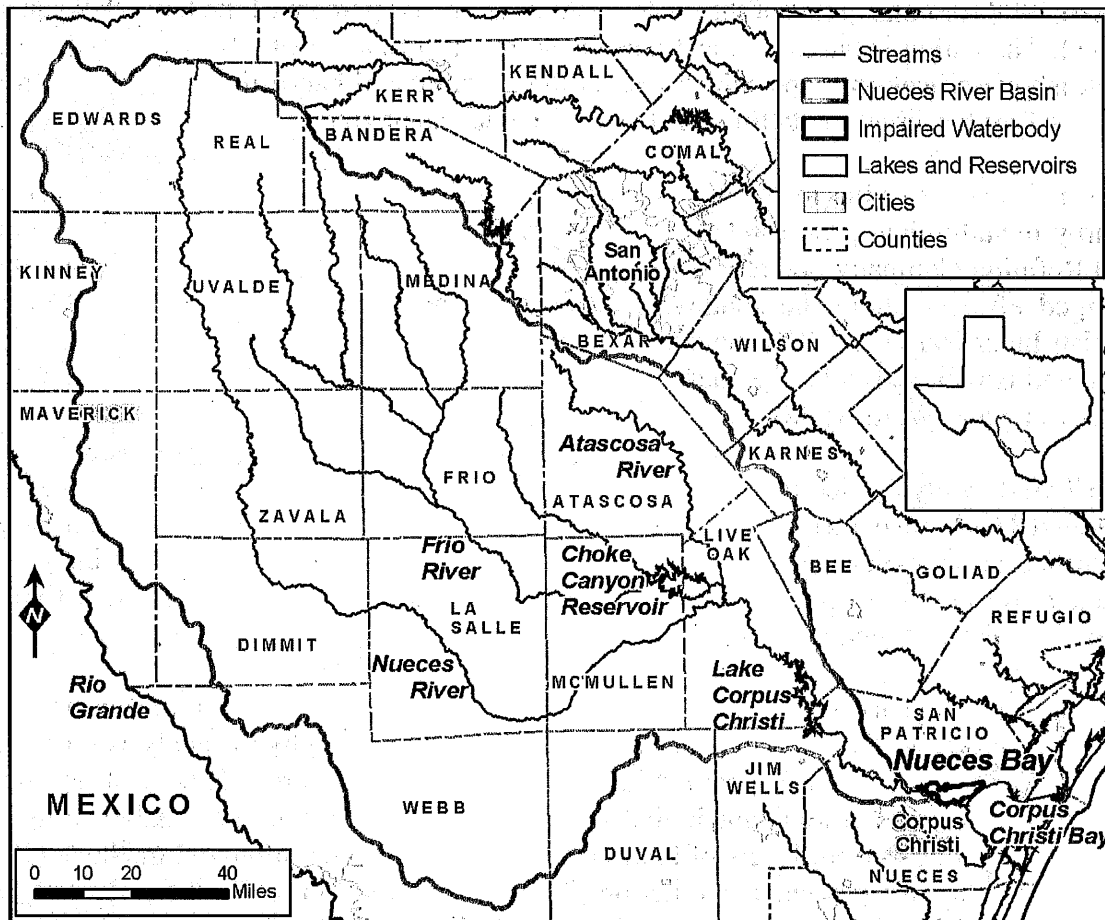


Figure 1. Nueces River Basin, Including Reservoirs, Tributaries, Rivers, and Adjacent Bays

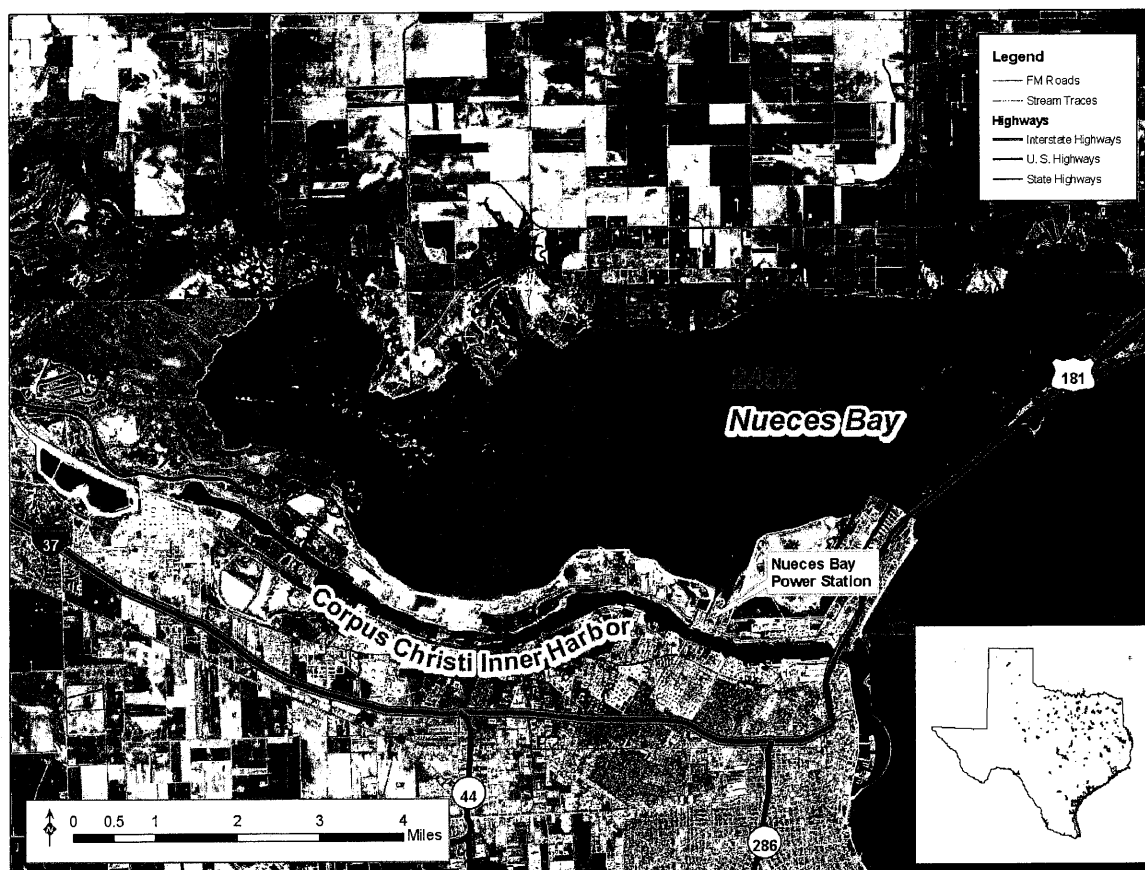


Figure 2. Nueces Bay

Implementation Strategy

The implementation strategy describes the actions that the TCEQ and its stakeholders will undertake to achieve water quality standards. The strategy specifies actions to meet the load allocations assigned to all point sources and nonpoint sources identified in the TMDL report. Action strategies may be selected from a menu of possible measures based on an evaluation of feasibility, costs, support, timing, and other factors. Activities may be implemented in phases based on the TCEQ's assessment of progress.

Measure 1. Document Natural Attenuation

Since the TMDL does not require a reduction in total loads of zinc to surface waters, control of sources will not be necessary. Attenuation of zinc in tissues will be tracked through data collection from oysters at several locations in the bay. In addition, collection of water samples will be necessary to ensure that levels of zinc in water do not become elevated and result in additional increases in oyster tissue. Maintenance of zinc levels in water at or near current levels will guarantee that zinc in oyster tissue will be reduced over time through attenuation.

Efforts to assess levels of zinc in Nueces Bay will be coordinated through existing programs at the TCEQ. Existing contractors will provide support for tissue monitoring

activities at several sites in the bay. Routine quarterly data collection by the TCEQ of water samples in the Corpus Christi Inner Harbor and Nueces Bay will provide additional assurances that concentrations are being maintained.

Point source discharges to Nueces Bay will also be monitored to ensure that additional zinc loadings will not affect the attenuation of zinc in oyster tissues. The Nueces Bay Power Station (NBPS) represents the largest proportion of the total load to Nueces Bay as identified in the TMDL, not because it is a source of zinc but because it moves a large volume of cooling water from the Inner Harbor to Nueces Bay. In recent decades zinc levels in the Inner Harbor have been lower than in Nueces Bay, but it is still a large volume of water that can be moved to Nueces Bay. This facility has been closed for several years, but in the event that the NBPS is reopened and begins to pump water from the Inner Harbor to Nueces Bay, additional reporting limits for zinc through amendments of existing TPDES permit might be a useful additional monitoring method.

Measure 2. Adjust the Water Quality Criteria

The development of the TMDL also led to the derivation of criteria better suited to protect oysters from high levels of zinc in the water column in Nueces Bay. Additional calculations determined that the zinc criteria included in the water quality standards should be lower. The water quality criteria included in the standards provide values for acute (92.7 µg/L) and chronic (84.7 µg/L) levels of dissolved zinc in water. The TMDL recalculated a criterion (29 µg/L) for total zinc in water which would result in tissue levels protective of the oyster water use. The use of total versus dissolved zinc is thought to be more protective since the suspended portion in water is also considered. This will ultimately result in criteria specific to Nueces Bay which is considerably more stringent than that included in the current water quality standards.

The adjustments to the water quality criteria will be facilitated through the triennial revisions to the water quality standards. This process updates the TCEQ rules (Title 30 TAC §307.1-10) to incorporate changes due to the availability new information on site-specific conditions or new methods by which criteria are derived. The revisions and subsequent approval process are coordinated by the Water Quality Standards Team at the TCEQ. The approved updates to the standards are included in the State's Water Quality Management Plan and implemented through several programs at the TCEQ. The rules were last updated in 2000 and the next revisions were initiated in 2007.

Implementation Tracking

This I-Plan includes provisions to track the progress of the plan using both implementation and water quality indicators. These terms are further defined as:

- **Programmatic Indicators** – A measure of administrative actions undertaken to effect an improvement in water quality.
- **Water Quality Indicators** – A measure of water quality conditions for comparison to pre-existing conditions, constituent loadings, and water quality standards.

Implementation tracking provides information that can be used to determine if progress is being made toward meeting goals. Tracking also allows stakeholders to evaluate actions

taken, identify those that may not be working, and make any changes that may be necessary to get the plan back on target. The TMDL program will be responsible for tracking attenuation of zinc in oyster tissues through the biennial status report.

Programmatic Indicators

TCEQ will initiate a project to monitor zinc in water and oyster tissue at specific locations in Nueces Bay. The TMDL Program will initiate a project to collect additional data to evaluate the attenuation of zinc in oyster tissue levels throughout Nueces Bay. Water samples will be collected and analyzed for total and dissolved zinc and Total Suspended Solids (TSS). Sediment samples will be collected and analyzed for zinc, total organic carbon, and grain size. Oysters will be sampled and analyzed for zinc at each of the stations (oysters would only be collected in the bay). These activities are expected to be funded through existing federal grants which support water quality enhancement projects.

The TMDL program will also participate in the upcoming water quality standards revision process and provide input specific to the revisions of zinc criteria.

Water Quality Indicators

The evaluation of the success of the implementation activities will be evident in reductions in oyster tissue zinc levels. Assessment of the oyster tissue data should provide insight to trends in zinc levels over time. In addition, the evaluation of zinc concentrations in the water will ensure that there is a low potential for additional increases in oyster tissue zinc levels.

Review Strategy

This I-Plan is a flexible tool that permits stakeholders to adapt to changing circumstances and to apply the lessons learned from experience. Stakeholders in I-Plans periodically assess the results of the planned activities along with other sources of information to evaluate the adequacy of the I-Plan. Stakeholders evaluate several factors such as the pace of implementation, the effectiveness of best management practices, reductions in pollutant loads, and progress toward meeting water quality standards.

The I-Plan presents a general process and timetable that specifies how and when the I-Plan will be evaluated and may be revised. The TCEQ will document the results of these evaluations and its rationale for maintaining or revising elements of the I-Plan, and will present them as part of the state's normal reporting processes.

The data collected through implementation tracking will be evaluated in order to assess attenuation of zinc in oyster tissues. Review of this data will provide insight towards the rate at which levels of zinc are decreasing and the effect of lower concentrations in the water column. If attenuation does not result in acceptable levels of zinc in oyster tissue the plan will need to be revised to evaluate other potential sources identified in the TMDL.

Communication Strategy

Communication is necessary to ensure that stakeholders understand the I-Plan and its progress in restoring water quality conditions. The TCEQ will disseminate the information derived from tracking I-Plan activities to interested parties, including watershed stakeholders, state leadership, government agencies, nongovernmental organizations, and individuals.

Results and progress will be documented in the TMDL Program's biennial status report. This report will summarize all actions taken to address the impairment and will report trends observed in the water quality data collected to track the progress of implementation. Work plans include a commitment to provide appropriate information to the TCEQ to update these progress assessments. Regionally, the progress of this implementation plan will be reported in the annual reports prepared by the Nueces River Authority under provisions of the Texas Clean Rivers Program.

References

- Armstrong, N.E., and G.H. Ward. 1998. Analysis of Point Source Discharges (including oil field brine discharges) in the Corpus Christi Bay National Estuary Program Study Area. Texas Natural Resource Conservation Commission, Austin, TX. CCBNEP-30.
- Barrera, T.A., L.R. Gamble, G. Jackson, T. Maurer, S.M. Robertson, and M.C. Lee. 1995. Contaminants Assessment of the Corpus Christi Bay Complex, Texas 1988-1989. U.S. Fish and Wildlife Services Field Office, Corpus Christi, TX.
- TCEQ 2006. Texas Commission on Environmental Quality. *One Total Maximum Daily Load for Zinc in Oyster Tissue in Nueces Bay*. <www.tceq.state.tx.us/implementation/water/tmdl/21-nuecesbay.html>.
- USEPA 2003. *Nonpoint Source Program and Grants Guidelines for States and Territories*. <www.epa.gov/fedrgstr/EPA-WATER/2003/October/Day-23/w26755.htm>. Accessed December 28, 2006.